BRANCH CANKERS OF RHODODENDRON.

BY HERMANN VON SCHRENK.

For a number of years the writer has observed a curious canker-like formation on branches of *Rhododendron maximum* throughout the Appalachian Mountains. These cankers appear in the form of large swellings of irregular shape. A number of these are reproduced on plate 5. In their simplest form, the swellings have a diameter in one direction two or three times the diameter of the branch on which they occur and anywhere from once to twice the thickness of the branch upon which they occur. In other words, they appear like flattened, more or less round, swellings. On one of the flattened sides, the swellings are covered with normal bark, and on the other side they usually show more or less well developed dead tissue, (figure 1, plate 5), and from this all the way to well marked holes, (figures 2, 3, 4 and 5, plate 5). These holes are sometimes so deep that the canker appears like a hollow cup. Not infrequently the cankerous formation takes place where two branches have diverged, (figures 3 and 4, plate 5), and in this case the dead, central tissue extends from one side to the other of the canker. Surrounding the dead portion a more or less vigorously formed callus covered with normal bark is found.

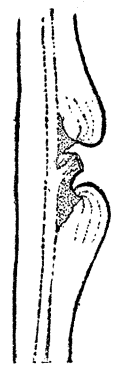
A large rhododendron shrub may have anywhere from one to forty or fifty of these cankers, sometimes two or three on one branch. The parts of the branch above and below the canker appear normal in every respect and usually are about the same size; in other words, the canker itself does not seem to materially influence the growth and development of the branch upon which it is situated. In this respect, these cankers differ very materially from cankers such as are caused by the various species of *Nectria*, or the various forms of fruit tree cankers. The rhododendron canker appears simply as a localized swelling, which does not seem to exert any influence upon the branch upon which it occurs.

A careful examination showed that cankers always originated around a small, dead branch. On plate 6, five stages of the canker development are shown. Figure 1 represents a living branch bearing a small, lateral branch which had recently died. Figure 2 shows a similar branch on which the lateral branch has been dead for a longer period, and figures 3, 4 and 5 show successive stages in the canker development. From an examination of an extended series of cankers in various stages, the conclusion is drawn that the development of these cankers was primarily due to an attempt on the part of the branch to heal over a dead branch stub. Woody plants, both trees and shrubs, differ very materially in the manner in which they heal over branch stubs. In the majority of forest trees, when a branch dies, the base of such a branch usually remains in a sufficiently intimate relationship to the parent branch so that the dead tissue is confined strictly to the branch up to the point where the living branch tissue comes into contact with the living tissue of the trunk or parent branch. In other words, that part of the branch situated within the trunk, to use a common expression, is supplied with water and food and remains alive. When the healing process begins, the tissue immediately surrounding the inserted branch starts to develop with greater rapidity, resulting in increased wood formation, and where the branch has broken off short, a marked callus soon arises which in time will cover the dead branch stub. The extent to which the tissue at the base of the branch stub assists in this healing process will vary considerably. In the genus *Picea*, for instance, the base of the branch stub remains alive for a very considerable period of time, giving rise to the well-known swellings commonly found on spruce trees at the base of dead branch stubs. Pines and many of the hardwood trees, on the other hand, form no such swellings at the base of the branch stub, because the branch in this case dies down close to the bark of the trunk. Owing to this difference in the behavior of the base of the dead branch, various species of forest trees heal over branch stubs with different rapidity and with varying degrees of success. In the white pine, for instance, a branch dies and in the course of time usually

breaks off close to the trunk or even within the bark layer of the trunk. A wound of this character then heals over rapidly. The same is true of trees like the beech, poplar and other hardwoods. In the case of the spruces, on the other hand, the base of the branch stub keeps on growing, and spruce trees are usually found with large numbers of dead branches extending out from the main trunk, and when these finally do break off, they break off two or three inches out from the trunk, and the healing, instead of taking place even with the surface of the trunk, takes place at a considerable distance out at the apex of a well marked cone.

The character of the healing is furthermore very considerably influenced by the rate of growth of the tree species. A rapidly growing tree will heal over branches very much more quickly than a slow growing tree.

In the case of the rhododendron cankers, one finds that when a lateral branch dies or where the leading shoot dies, the wood of the parent branch or trunk immediately surrounding the base of the dead branch likewise dies, and frequently for a very considerable distance from the base of the branch (see figure). The healing layer then starts to form at a considerable distance away from the base of the dead branch. The dead branches of rhododendron are very persistent; *i. e.*, they break off in such a manner that the dead stub is usually an inch or more in length. The rate of growth of the rhododendron is extremely slow, and it therefore takes a very long time for a branch stub to be completely healed over; so long, in fact, does this take that in the majority of instances the dead branch stub has begun to rot away long before the parent branch has succeeded in covering the stub. Figures 3 and 4, plate 5, show two of these branch stubs, both of which are gradually decaying. Owing to the slow growth of the rhododendron wood, the callous lips increase in size from year to year and gradually give rise to a small knot or swelling, (figure 3, plate 6), which increases in size as the



SECTION OF OLD CANKER.

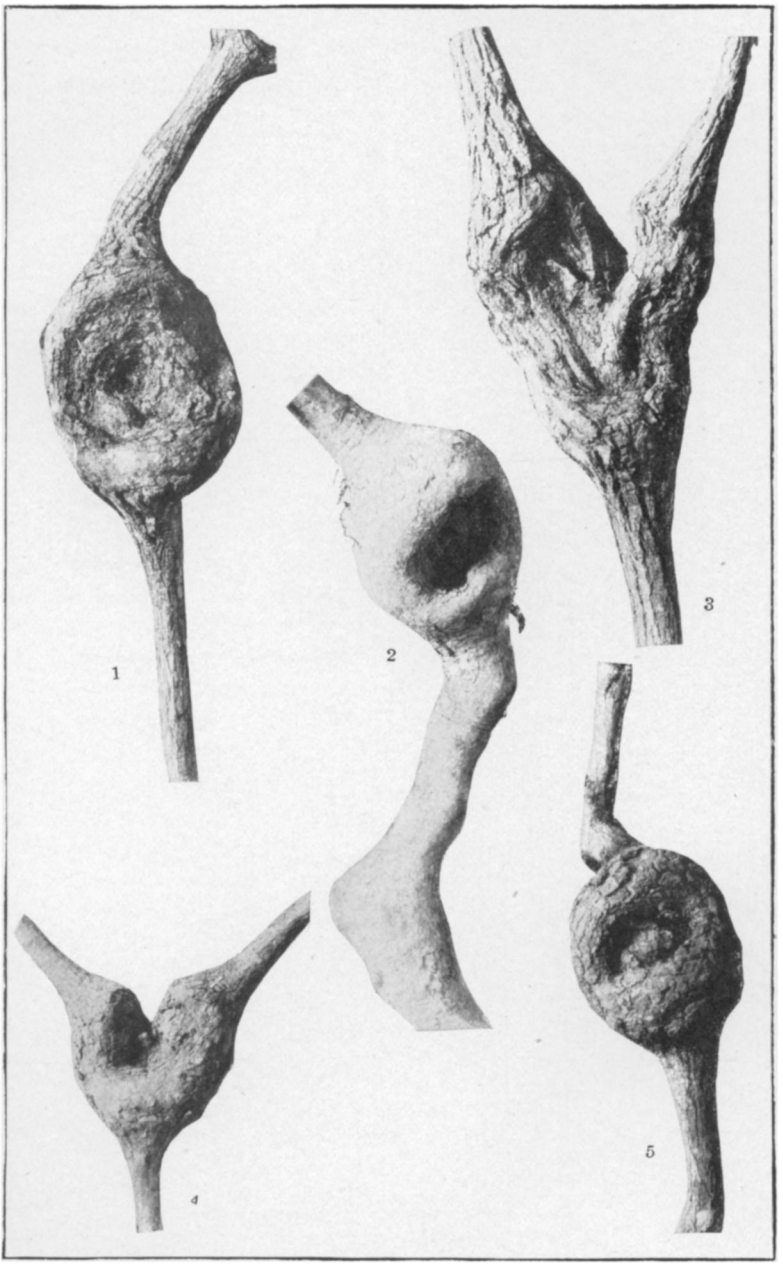
branches grow older and ultimately large swellings are produced. In the older swellings, the small branch stub which gave rise to the swelling has by this time usually completely rotted away and the saprophytic fungi which brought about the decay of the small branch stub have usually by this time grown with considerable rapidity in the dead tissue on the surrounding base of the branch stub, so that in the course of time, deep holes filled with decayed wood matter result, (figure 5, plate 6, and figure 2, plate 5). It not infrequently happens that the healing callus is killed either by fungi, which have lodged in the developed canker, or by frost, and in such cases, a series of callous lips will appear in these older cankers, (figures 1 and 3, plate 5). Primarily, however, but one callous layer is found, and when this finally succeeds in healing over the wound, the cankers appear on the branch as small, round knobs, completely covered by normal bark. The text figure shows a longitudinal section of a canker in its later stages. From this, the relationship which the dead branch stub bears to the lips of the swelling will be perfectly evident.

The formation of these branch cankers is presented as an interesting instance of the manner in which pathological conditions may arise in forest trees without the direct interference of other living organisms, either fungi or insects.

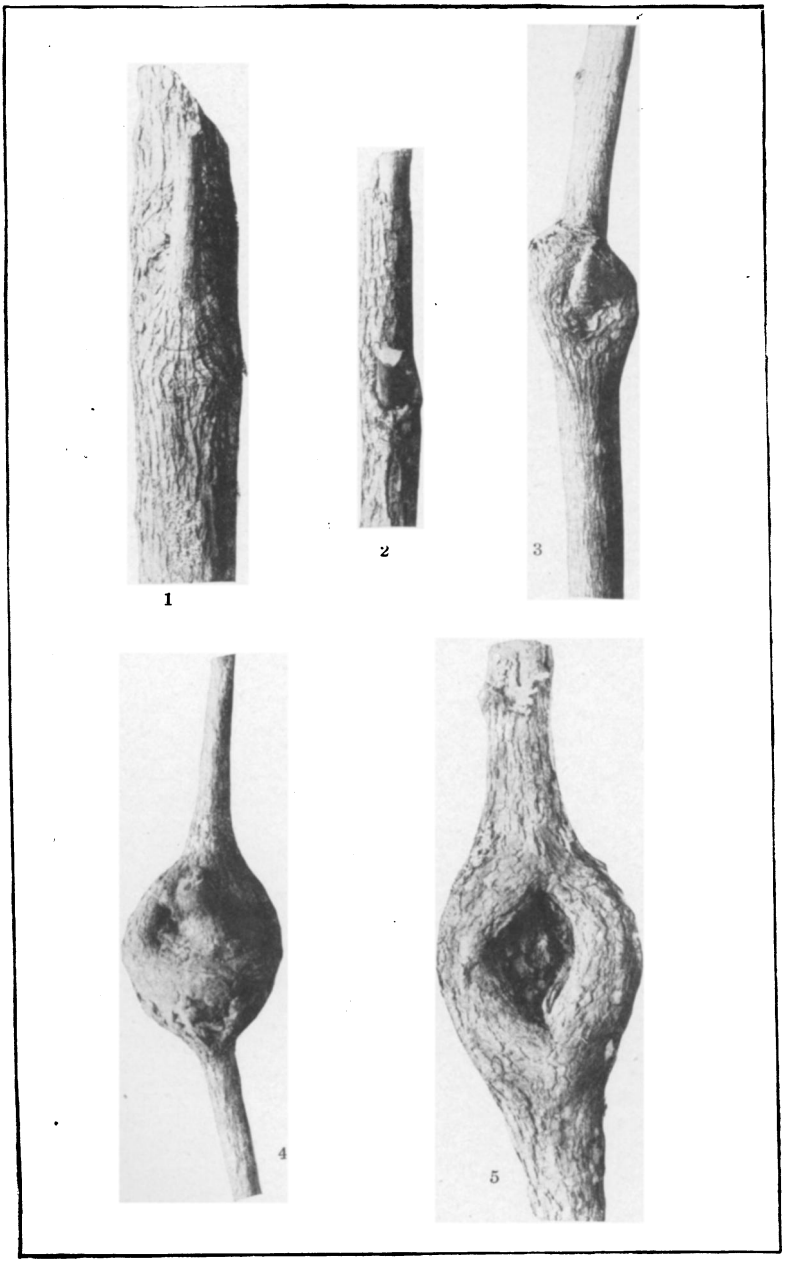
EXPLANATION OF PLATES.

Plate 5.—Cankers on rhododendron branches.

Plate 6.—Showing development of cankers around the base of a dead branch. Figures 1–5 show successive stages from the recently dead branch to the fully formed cankers.



CANKERS ON RHODODENDRON.



CANKER FORMATION ON RHODODENDRON.